

CLAIMS:

- 5 1. A method of generating a computer readable model of a geometrical object constructed from a plurality of interconnectable construction elements, wherein each construction element has a number of connection elements for connecting the construction element with another construction element, the method comprising
- 10 encoding a first and a second one of the plurality of construction elements as corresponding first and second data structures, each representing the connection elements of the corresponding construction element, and each of the connection elements having associated with it one of a plurality of
- 15 predetermined connection types;
- determining a first connection element of the first construction element and a second connection element of the second construction element located in a predetermined proximity of each other; and
- 20 retrieving connectivity information of the corresponding connection types of the first and second connection elements indicative of whether the first and second connection elements provide a connection between the first and the second construction element.
- 25 2. A method according to claim 1, characterised in that the method further comprises providing a connection table including connectivity information of pairs of the connection types; and the step of retrieving connectivity information comprises retrieving the connectivity information from the connection table.
- 30 3. A method according to claim 1 or 2, characterised in that the method further comprises

- providing a combination table including a resulting connection type for each of a predetermined set of pairs of connection types;
 - determining a first and a second connection element that are positioned in a predetermined geometric relationship to each other;
 - 5 - retrieving a resulting connection type of the first and second connection elements from the combination table; and
 - assigning the retrieved resulting connection type to at least a resulting connection element.
- 10 4. A method according to any one of claims 1 through 3, characterised in that each of the respective data structures further represents a number of grids relative to the corresponding construction element, each grid having a number of grid points; and each of the connection elements of the construction element is associated with one of the grid points and has a
15 corresponding connection type.
- 5. A method according to claim 4, characterised in that each of the grids has at least one grid edge and the method further comprises
 - providing a combination table including a resulting connection type for
20 each pair of connection types;
 - detecting if a first grid of the first construction element is placed in an edge to edge extension of a second grid of the second construction element, a first edge of the first grid being aligned with a second edge of the second grid;
 - 25 - for a first connection element of the first grid identifying a corresponding second connection element of the second grid;
 - retrieving a resulting connection type of a combination of the first and second connection elements from the combination table; and
 - assigning the retrieved resulting connection type to the first and second
30 connection elements.
- 6. A method according to claim 4 or 5, characterised in that each of the respective data structures further represents a bounding volume of the

corresponding construction element; and each of the grids corresponds to a surface of the bounding volume.

5 7. A method according to claim 6, characterised in that the method further comprises

10 encoding respective positions of the first and second construction element with respect to a common volume reference grid, the first and second grid of the corresponding first and second construction elements corresponding to respective first and second planes of the volume reference grid; the grid points of the first and second grids corresponding to respective reference grid points of the volume reference grid; and

15 detecting whether the first and second grids correspond to a common plane of the volume reference grid and whether at least a first grid point of the first grid is located in the same reference grid point as a second grid point of the second grid.

20 8. A method according to claim 7, characterised in that the method further comprises

- identifying all pairs of coinciding grid points of the first grid and the second grid;
- for each of the identified pairs of grid points retrieving connectivity information from the connectivity table;
- 25 - refusing connection between the first and second construction elements, if at least one pair of grid points corresponds to an invalid connection; otherwise accepting connection between the first and second construction elements, if at least one pair of grid points corresponds to a valid connection.

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9. A method according to any one of claims 1 through 8, characterised in that each of the connection elements further has an associated direction.

10. A method according to any one of claims 1 through 9, characterised in that the connectivity information comprises an indicator for each pair of connection types indicating one of a predetermined group of connectivity types, the group consisting of a valid connection which provides a connection
5 between a corresponding pair of connection elements, an invalid connection which prevents a connection between a corresponding pair of connection elements, and an indifferent connection.
11. A method according to any one of claims 1 through 10, characterised in
10 that the step of determining a first connection element of the first construction element and a second connection element of the second construction element located in a predetermined proximity of each other further comprises determining the first and second connection elements from a predetermined subset of connection elements.
12. A method according to claim 11, characterised in that each of the
15 respective data structures further represents a bounding volume of the corresponding construction element; the method further comprises detecting an intersection of the bounding volumes of the first and second construction
20 elements; and the step of determining the first and second connection elements from a predetermined subset of connection elements comprises determining the first and second connection elements from connection elements comprised in the determined intersection.
- 25 13. A data processing system comprising
- means for generating a computer readable model of a geometrical object constructed from a plurality of interconnected construction elements, wherein each construction element has a number of connection elements for
30 connecting the construction element with another construction element;
- means for encoding a first and a second one of the plurality of construction elements as corresponding first and second data structures, each

representing the connection elements of the corresponding construction element, and each of the connection elements having associated with it one of a plurality of predetermined connection types;

- 5 means for determining a first connection element of the first construction element and a second connection element of the second construction element located in a predetermined proximity of each other; and
- 10 means for retrieving connectivity information of the corresponding connection types of the first and second connection element indicative of whether the first and second connection elements provide a connection between the first and the second construction element.
- 15 14. A data processing system according to claim 13, characterised in that the data processing system further comprises storage means for storing a connection table including connectivity information of pairs of the connection types.
- 20 15. A data processing system according to claim 13 or 14, characterised in that the data processing system further comprises storage means for storing a combination table including a resulting connection type for each of a predetermined set of pairs of connection types.
- 25 16. A computer program comprising program code means for performing all the steps of any one of the claims 1 to 12 when said program is run on a computer.
- 30 17. A computer program product comprising program code means stored on a computer readable medium for performing the method of any one of the claims 1 to 12 when said computer program product is run on a computer.